Linear Programming #2

1. In order to ensure optimal health (and thus accurate test results), a lab technician needs to give rabbits a daily diet containing a minimum of 24 grams (g) of fat, 36 g of carbohydrates, and 4 g of protein.

Rather than order rabbit food that is custom-blended, it is cheaper to order Food X and Food Y, and blend them for an optimal mix. Food X contains 8 g of fat, 12 g of carbohydrates, and 2 g of protein per ounce, and costs $0.20 per ounce. Food Y contains 12 g of fat, 12 g of carbohydrates, and 1 g of protein per ounce, at a cost of $0.30 per ounce.
What is the optimal blend?

$C = .2x + .3y$

3, 0	.60
0, 4	1.20
1, 2	.80

3 oz of food X

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2. Space food A contains 3 calories per gram; space food B contains 4 calories per gram. An astronaut's food bar can contain no more than 30 g of space food A and no more than 20 g of space food B and can have a maximum of 110 calories.

x = A

y = B

Write the inequalities defining the restrictions

$A \geq 0 \quad B \geq 0$

Graph the inequalities

Find the corner points

$(0, 27\frac{1}{2})$

$(36\frac{2}{3}, 0)$

$3A + 4B \leq 110$

$A \leq 30$

$B \leq 20$

If space food A contains 10 units of protein per gram and space food B contains 20 units of protein per gram, find a function that gives the number of units of protein of x grams of food A and y grams of food B.

Evaluate this function on the corner points and tell which gives the maximum amount of protein.

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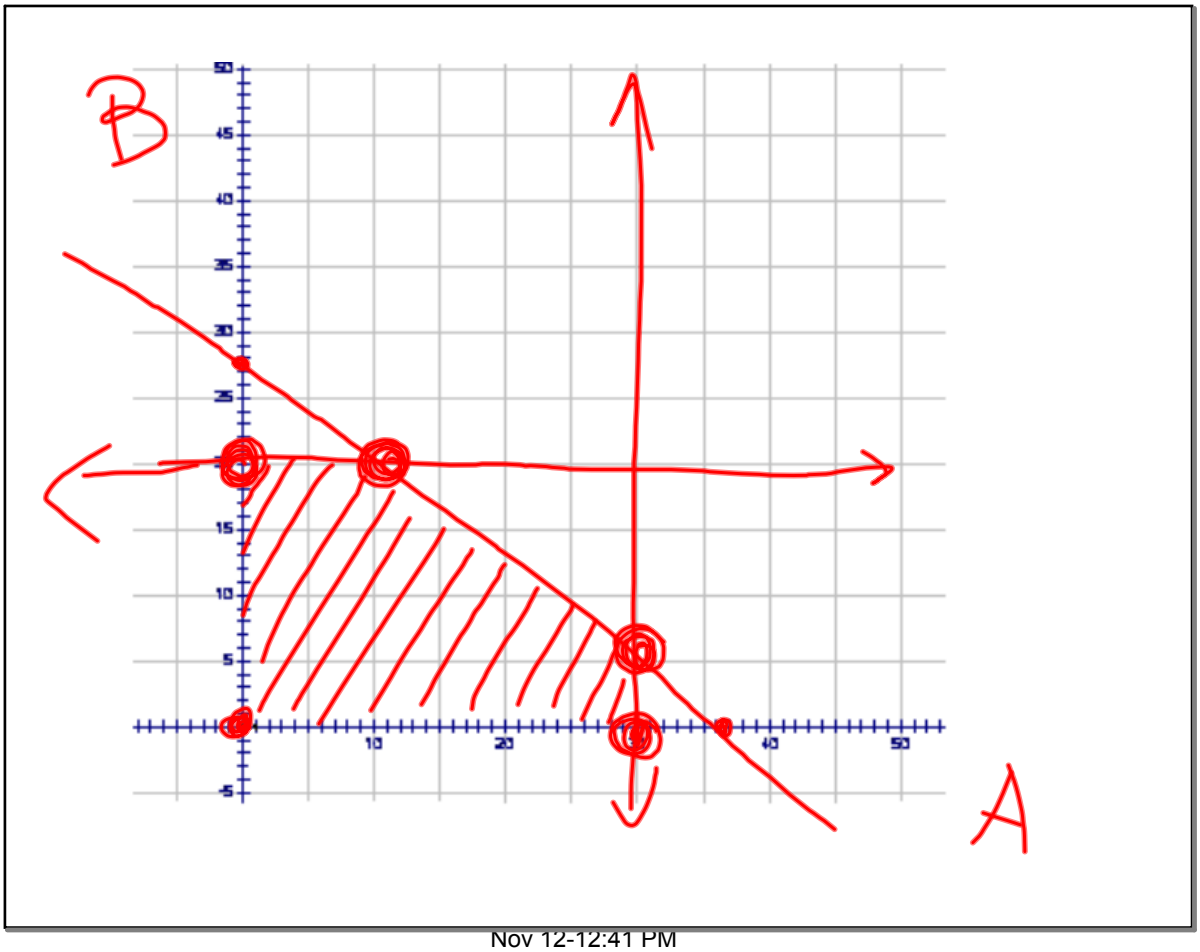

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	P = 10A + 20B
0, 0	0
0, 20	400
10, 20	500
30, 0	300
30, 5	400

10g of A & 20g of B

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3. An electronics company manufactures two models of smoke detectors. Model-A requires 1 unit of labor and 4 units of parts; model-B requires 1 unit of labor and 3 units of parts. If 90 units of labor and 320 units of parts are available, and if the company makes a profit of $5 on each model-A detector and $4 on each model-B detector, how many of each model should it manufacture to maximize its profit?

$A + B \leq 90$

$4A + 3B \leq 320$

$A \geq 0$

$B \geq 0$

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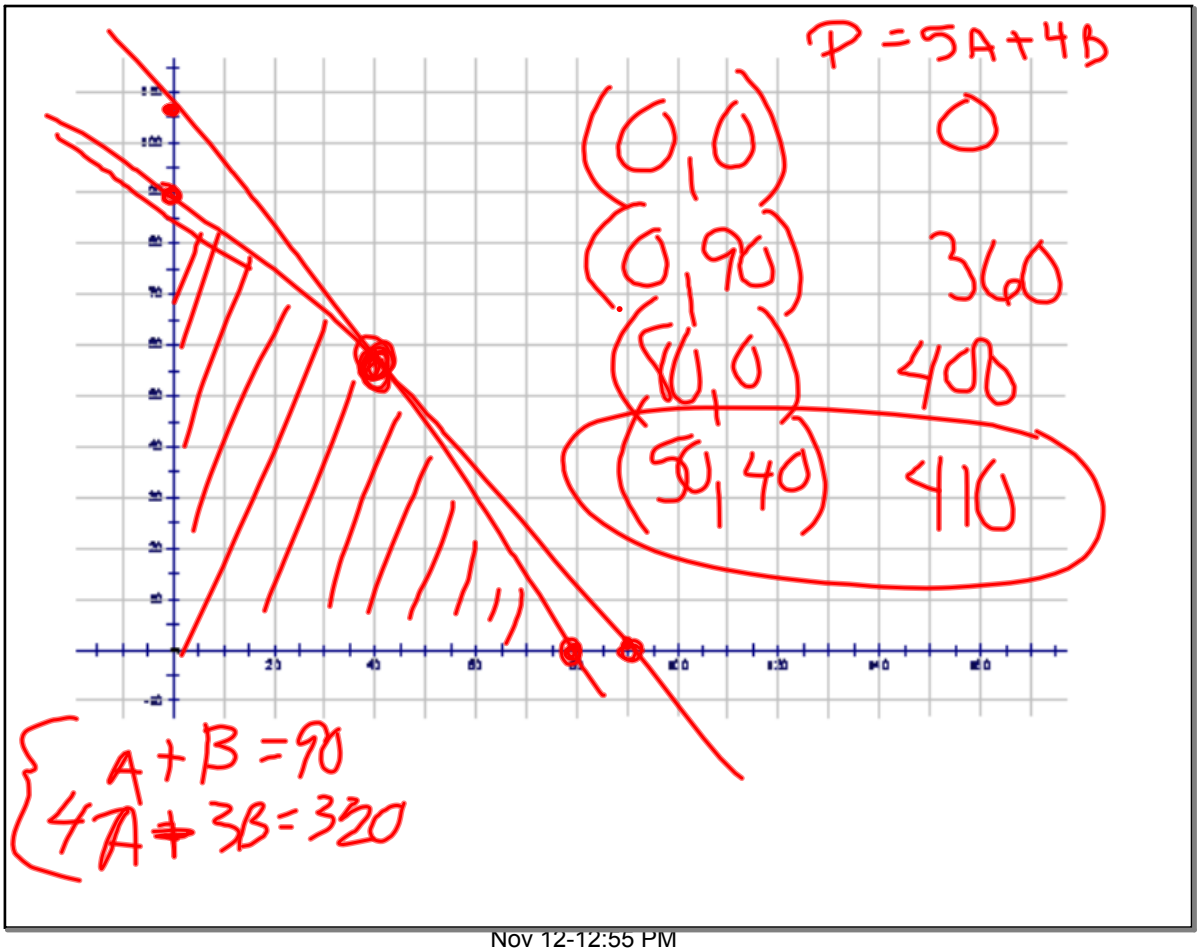

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